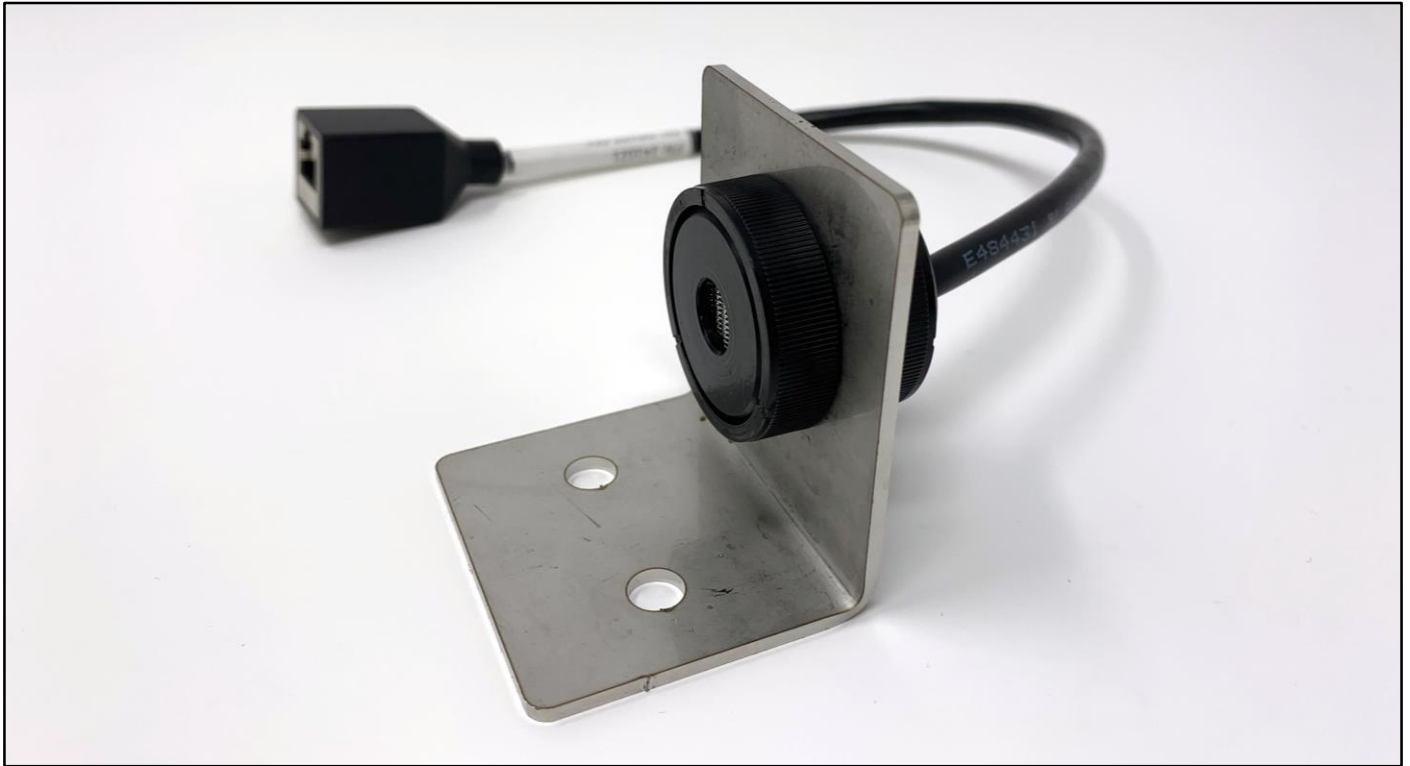




## Technical Datasheet



### Product Description:

The Fault Detector – Module Level product is a low-power and compact device that monitors lithium-ion batteries for increased safety. The monitor is integrated into lithium-ion battery systems and provides a signal that indicates whether a single cell within the module has experienced an off-gassing event.

Our products provide value through gas sensing that is acutely sensitive to battery electrolyte solvent vapors. This sensing ability is paired with proprietary algorithms and creates a product that can detect a single cell failure without electrical interrogation or mechanical contact of the cells. At times, the Fault Detector can detect battery failures prior to traditional monitoring methods such as temperature and voltage monitoring. By delivering warning well ahead of thermal runaway the Fault Detector enables battery failure prevention.

The utilization of off-gas monitoring creates a completely independent perspective of battery health that can be used to provide an extra layer of safety for your lithium-ion battery systems.

### Key Features:

- Compatible with all lithium-ion battery form factors and chemistries
- Parts-per-million level detection threshold
- Calibration-free product
- Distributed sensing network provides localized gas detection
- Provides early warning of lithium-ion battery failures
- Long product lifetime
- Fast response time to off-gassing events
- Highly reliable output signal
- Low power consumption
- Several mounting options
- Unobtrusive sensor with easy installation
- Independent and redundant perspective on battery health



## Physical description:

The Fault Detector Module Level product consists of an off-gas monitor with several mounting options, intended to be placed within a battery module. The product then offers sensing capability of gas space around the battery module and will have the capability to provide early warning of battery failures.

\*Custom cable lengths are available. Adapter available for bare wire usage.

## Environmental description:

The Fault Detector product is intended to be integrated into spaces with lithium-ion batteries and, therefore, has very similar specifications to that of a standard lithium-ion battery system.

## Electrical description:

The Fault Detector product provides signals specific to the battery module where it is installed. With this localized signal, you will be able to know not only when your battery module is experiencing a problem, but also you will have early warning of a fully developed lithium-ion battery failure. Signal outputs from the Fault Detector can be tied into a BMS or other controller.

### Physical specifications

Part	Dimensions
Sensor	Ø 28.6 x 25.4 [mm]
Monitor cable	165 [mm]*
Connector type	Female RJ45
Wire type	Brown (POWER +)
	Green/White (GND)
	Brown/White (SIGNAL +)

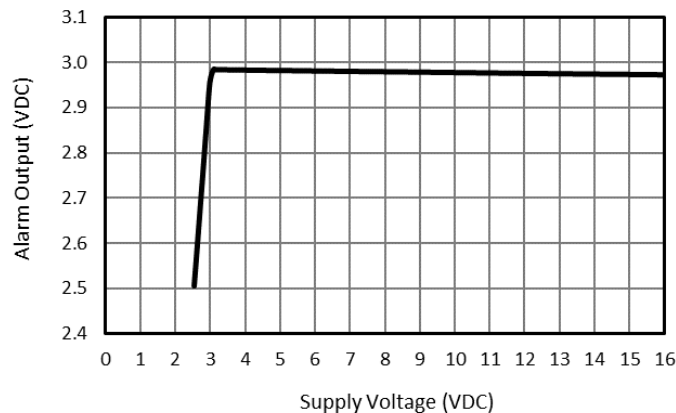
### Environmental specifications

Condition	Specification
Temperature (Operate)	-10 to +60°C
Temperature (Store)	-10 to +70°C
Humidity	5 to 95% RH
Max temperature change	8.6°C/min

### Electrical specifications

Detail	Specification
Controller power input	3 - 16 VDC
Power consumption	275 mW (@ 5VDC and 25°C)
Output signal (error state)	0.10 VDC
Output signal (warm up)	0.25 VDC
Output signal (OK)	0.50 VDC
Output signal (alarm)	3.0 VDC (see graph below)

ALARM OUTPUT vs SUPPLY VOLTAGE



**Gas detection description:**

The Fault Detector is equipped with a sensing element that is acutely sensitive to lithium-ion battery electrolyte solvent vapors. This acute sensitivity is how this product is able to provide indication of a single cell battery failure without electrical or mechanical contact of battery cells.

**Gas detection specifications**

<b>Detail</b>	<b>Specification</b>
Target gases	Lithium ion battery electrolyte solvent vapors
Min. detection threshold	<1 ppm/sec
Response time	5 seconds
Fault detection	Single cell failure

**Product life description:**

The associated algorithms provided an extended lifetime product that does not require calibration. The product is intended to have comparable lifetime to lithium-ion battery systems.

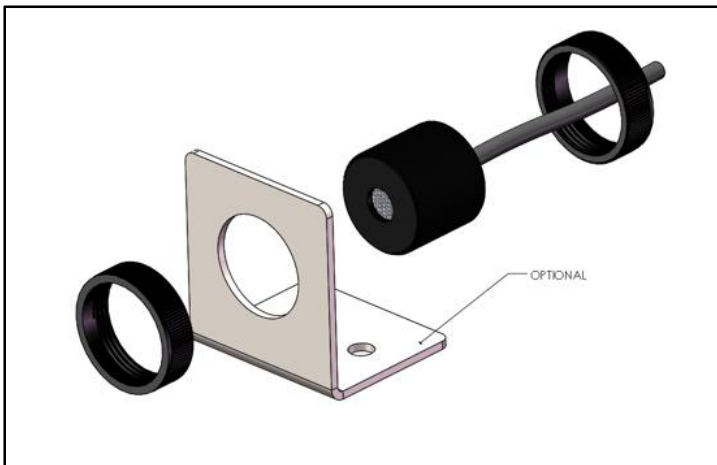
**Product life specifications**

<b>Detail</b>	<b>Specification</b>
Target lifetime	10 years
Warranty	1 year

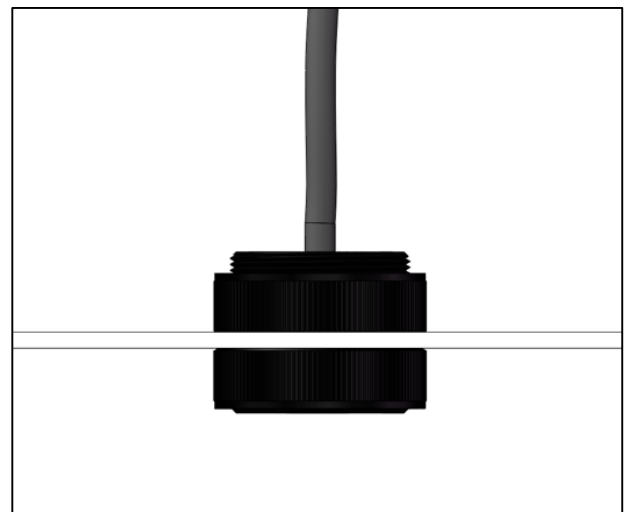
**Product certifications**

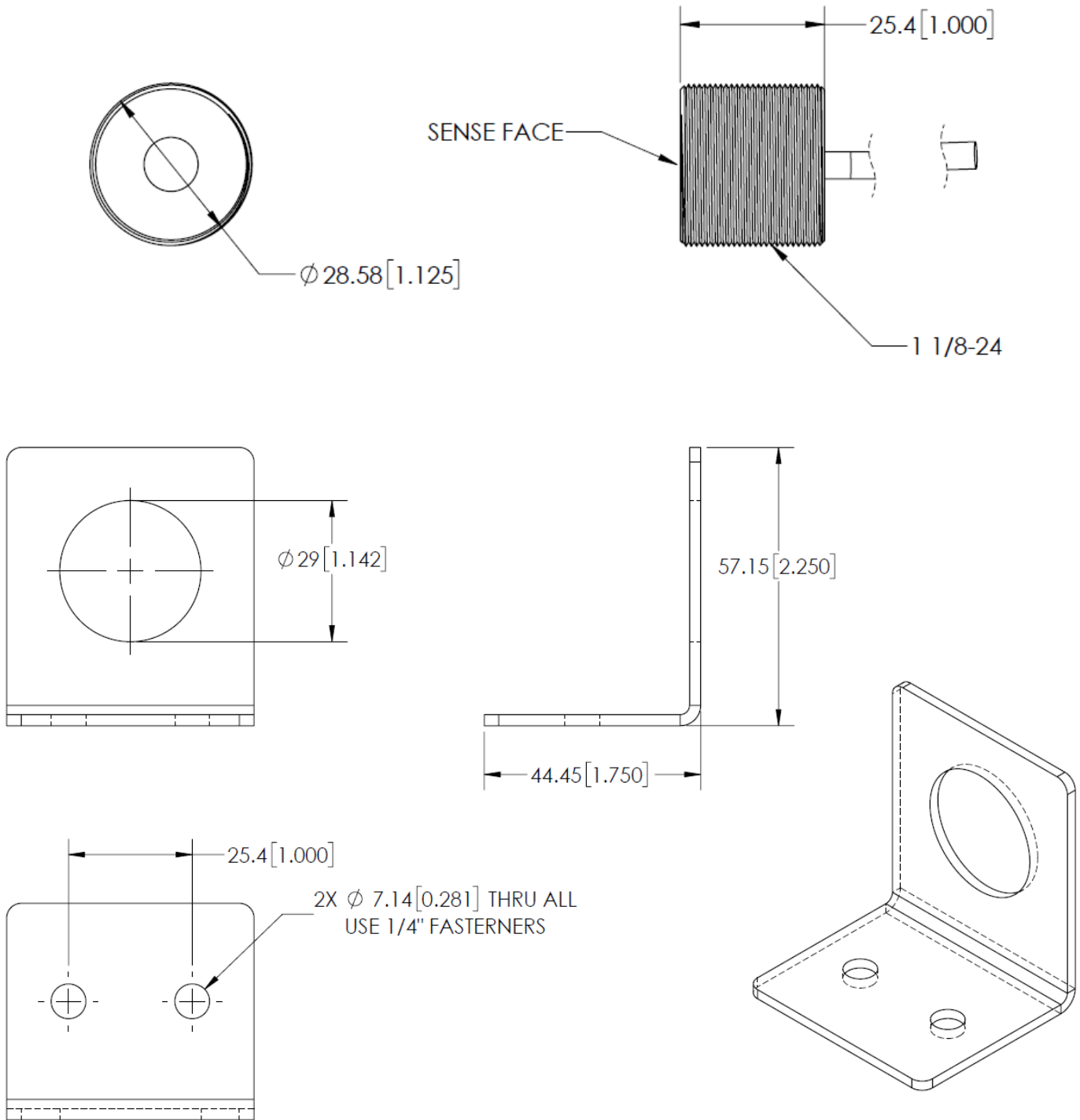
<b>Detail</b>	<b>Standard/Directive</b>
Product Safety	UL/IEC 61010
EMC	EN 60326-1 for EU Directive (2014/30/EU)
RoHS	RoHS 3 EU 2015/863

**Mounting bracket**



**Through-wall mount**





**NOTICE:** This device detects off-gas from lithium-ion batteries. It does not prevent fires or thermal runaway. This device is not a stand alone safety device and should be incorporated into a proper safety system. If device responds, there is a risk of battery fault which could lead to thermal runaway. To avoid injury, leave area immediately.